

**ON-P-GaAs SUBSTRATE $\text{Zn}_{1-x}\text{Mg}_x\text{S}_y\text{Se}_{1-y}$ PIN PHOTODIODE
AND ON-P-GaAs SUBSTRATE $\text{Zn}_{1-x}\text{Mg}_x\text{S}_y\text{Se}_{1-y}$ AVALANCHE PHOTODIODE**

ABSTRACT OF THE DISCLOSURE

A blue-ultraviolet on-p-GaAs substrate pin $\text{Zn}_{1-x}\text{Mg}_x\text{S}_y\text{Se}_{1-y}$ photodiode with high
5 quantum efficiency, small dark current, high reliability and a long lifetime. The ZnMgSSe
photodiode has a metallic p-electrode, a p-GaAs single crystal substrate, a p-(ZnSe/ZnTe)^m
superlattice (m: integer number of sets of thin films), an optionally formed p-ZnSe buffer
layer, a p- $\text{Zn}_{1-x}\text{Mg}_x\text{S}_y\text{Se}_{1-y}$ layer, an i- $\text{Zn}_{1-x}\text{Mg}_x\text{S}_y\text{Se}_{1-y}$ layer, an n- $\text{Zn}_{1-x}\text{Mg}_x\text{S}_y\text{Se}_{1-y}$ layer, an n-
electrode and an optionally provided antireflection film. Incidence light arrives at the i-layer
10 without passing ZnTe layers. Since the incidence light is not absorbed by ZnTe layers, high
quantum efficiency and high sensitivity are obtained.

A blue-ultraviolet on-p-GaAs substrate avalanche $\text{Zn}_{1-x}\text{Mg}_x\text{S}_y\text{Se}_{1-y}$ photodiode with
high sensitivity, high quantum efficiency, a wide sensitivity range, high reliability and a long
lifetime. The ZnMgSSe avalanche photodiode has a metallic p-electrode, a p-GaAs single
15 crystal substrate, a p-(ZnSe/ZnTe)^m superlattice (m: integer number of sets of thin films), an
optionally formed p-ZnSe buffer layer, a p- $\text{Zn}_{1-x}\text{Mg}_x\text{S}_y\text{Se}_{1-y}$ layer, a lower doped n⁻- $\text{Zn}_{1-x}\text{Mg}_x\text{S}_y\text{Se}_{1-y}$
layer, a higher doped n⁺- $\text{Zn}_{1-x}\text{Mg}_x\text{S}_y\text{Se}_{1-y}$ layer, an n-electrode and an optionally
provided antireflection film. Since the incidence light is not absorbed by ZnTe layers, a high
avalanche gain, high quantum efficiency and high sensitivity are obtained.